

# **EXHIBIT 112**

**UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF ILLINOIS  
EASTERN DIVISION**

ANDREW CORZO, SIA HENRY, MICHAEL MAERLANDER, ALEXANDER LEO-GUERRA, BRANDON PIYEVSKY, BENJAMIN SHUMATE, BRITTANY TATIANA WEAVER, and CAMERON WILLIAMS, individually and on behalf of all others similarly situated,

*Plaintiffs,*

v.

BROWN UNIVERSITY, CALIFORNIA INSTITUTE OF TECHNOLOGY, UNIVERSITY OF CHICAGO, THE TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK, CORNELL UNIVERSITY, TRUSTEES OF DARTMOUTH COLLEGE, DUKE UNIVERSITY, EMORY UNIVERSITY, GEORGETOWN UNIVERSITY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, NORTHWESTERN UNIVERSITY, UNIVERSITY OF NOTRE DAME DU LAC, THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA, WILLIAM MARSH RICE UNIVERSITY, VANDERBILT UNIVERSITY, and YALE UNIVERSITY,

*Defendants.*

Case No. 1:22-cv-00125

*Class Action*

**EXPERT REPORT OF GEORGE BULMAN, PH.D.**

May 14, 2024

**This Report references material designated by Defendants as Confidential or AEO under the Second Amended Confidentiality Order (ECF No. 576).**

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## I. Introduction, Definitions, and Assignment

1. The Defendants<sup>1</sup> in this litigation are private universities of elite and national status, and each held membership in the 568 Presidents Group (the “568 Group”) at some point in time between January 1, 1998, and approximately November 4, 2022. The Plaintiffs in this case constitute a number of former undergraduate students who attended the universities operated by Defendants and received need-based institutional financial aid from the Defendants during the Class Period (as defined below).<sup>2</sup> Plaintiffs seek to represent a Class (as defined below) of current and former similarly situated students that either are currently attending or attended the Defendant universities.

2. I understand that the “568” in “the 568 Group” refers to Section 568 of the Improving America’s Institutions Act of 1994. Prior to its expiration, that section exempted qualifying agreements between institutions of higher education from antitrust scrutiny provided that each participating institution admitted all of its students who were U.S. citizens or domestic U.S. residents “on a need-blind basis.” The statute defined the exemption for admission “on a need-blind basis” to mean “without regard to the financial circumstances of the student involved or the student’s family.”<sup>3</sup> This exemption stipulated that it “shall not be unlawful under the antitrust laws for 2 or more institutions of higher education at which all students admitted are admitted on a need-blind basis, to agree or attempt to agree” on a number of actions, including the award of financial

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<sup>1</sup> “Defendants” are Brown University, California Institute of Technology, University of Chicago, The Trustees of Columbia University in the City of New York, Cornell University, Trustees of Dartmouth College, Duke University, Emory University, Georgetown University, The Johns Hopkins University, Massachusetts Institute of Technology, Northwestern University, University of Notre Dame du Lac, The Trustees of the University of Pennsylvania, William Marsh Rice University, Vanderbilt University, and Yale University. In this report, I sometimes refer to these schools by their common shorthand.

<sup>2</sup> Institutional aid is defined by the College Board as the “financial aid” that “is provided by the college or university you plan to attend.” <https://bigfuture.collegeboard.org/pay-for-college/get-help-paying-for-college/state-and-institutional-financial-aid>.

<sup>3</sup> 15 U.S.C. § 1, note.

aid on a the basis of demonstrated financial need alone; the use of common principles of analysis, provided that those principles do not restrict independent professional judgment; and the use of a common aid application, so long as the application does not preclude the request or use of additional data.<sup>4</sup>

3. As relevant to this report, Plaintiffs allege that the Defendants cannot qualify for the 568 exemption because, in each year at issue, at least one Defendant did not admit all of its U.S. citizen and domestic resident undergraduate students on a need-blind basis.<sup>5</sup> Plaintiffs also allege that Defendants entered into a conspiracy by joining or associating with the 568 Group in order to achieve the end of decreasing the amount of overall institutional grant aid and artificially increasing the difference between the list price of attending the institution and the institutional grant aid provided. When I use the term “institutional grant aid” in this report, it is defined as any financial grant or scholarship aid awarded to students that students are not required to repay (“gift aid”).<sup>6</sup> The “effective institutional price” is the list price after subtracting any institutional grant aid. The conspiracy alleged by Plaintiffs is hereafter referred to in this report as the “Challenged Conduct” or “Overarching Agreement.”

4. I understand from Plaintiff and Class Counsel that the Challenged Conduct occurred over the “Class Period” (as defined below).<sup>7</sup> I understand further that the Challenged

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<sup>4</sup> Section 568(a).

<sup>5</sup> Second Amended and Supplemental Class Action Complaint (“Compl.”), ECF No. 308, ¶¶ 3-4.

<sup>6</sup> Many institutions, including some Defendants, provide grants that are not based on need, which are generally known as “merit aid.” The analyses I conduct are based on publicly available institutional grant aid data that I describe below. My regression estimates do not materially change when I adjust institutional aid to account for the small amounts of merit aid some Defendants have provided.

<sup>7</sup> When I refer later in this report to the “introduction” of the Challenged Conduct, the earliest year is the academic year 2003-04, and for certain Defendants (Brown, Dartmouth and Emory), the introduction date is the academic year, 2004-05. I treat much later joiners, Caltech and Johns Hopkins, in the “post” introduction period, in the years in which those two institutions joined, consistent with the definitions in the Class Period.

Conduct included an alleged agreement among them to apply a “consensus approach” to financial aid, which approach involved reaching agreement on: (1) six core principles of awarding financial aid; (2) making need-based aid the primary form of financial aid; (3) use of the Institutional Methodology (defined below), or IM, as the “base” method for need analysis and as starting point for calculating financial aid; (4) developing and implementing the Consensus Methodology (defined below), or CM, as a variation of the IM for purposes of need analysis; (5) using a common manual for applying “professional judgment” to determinations of need, and that professional judgment was to be the exception, rather than the rule; and (6) reciprocally sharing competitively sensitive information relating to principles, practices, amounts, and methods regarding provision of financial aid.

5. Plaintiffs define the “Class” as follows: “All persons who have during the Class Period (a) enrolled in one or more of Defendants’ full-time undergraduate programs, (b) received at least some need-based financial aid from one or more Defendants, and (c) whose tuition, fees, room, or board to attend one or more of Defendants’ full-time undergraduate programs was not fully covered by the combination of any types of grant or merit aid in any undergraduate year.<sup>8</sup>

6. Plaintiffs define the “Class Period” as follows:

- a. For Brown, Dartmouth, and Emory—from fall term 2004 through June 30, 2023.

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<sup>8</sup> Compl. ¶ 200. Excluded from the Class are: (a) Any Officers<sup>8</sup> and/or Trustees of Defendants, or any current or former employees holding any of the following positions: Assistant or Associate Vice Presidents or Vice Provosts, Executive Directors, or Directors of Defendants’ Financial Aid and Admissions offices, or any Deans or Vice Deans, or any employees in Defendants’ in-house legal offices; and (b) Any person who was not a U.S. citizen or permanent resident at the time such person attended a full-time undergraduate program and received at least some need-based financial aid from one or more Defendants; and (c) the Judge presiding over this action, his or her law clerks, spouse, and any person within the third degree of relationship living in the Judge’s household and the spouse of such a person.

The Columbia “Officers” excluded from the Class are members of the Senior Administration of Columbia and do not include exempt employees of Columbia referred to as officers.

- b. For Chicago—from fall term 2003 through June 30, 2014.
- c. For Columbia, Cornell, Duke, Georgetown, MIT, Northwestern, Notre Dame, and Rice—from fall term 2003 through June 30, 2023.
- d. For Penn—from fall term 2003 through June 30, 2019.
- e. For Vanderbilt—from fall term 2003 through June 30, 2020.
- f. For Yale—from fall term 2003 through June 30, 2007, and from fall term 2018 through June 30, 2023.
- g. For Caltech—from fall term 2020 through June 30, 2023.
- h. For Johns Hopkins—from fall term 2022 through June 30, 2023.

7. I use various other terms in this report, which I define as follows:

- a. The term “institutions” refers to colleges and universities generally.
- b. The term “list price,” as noted, refers to the total of tuition, fees, and room and board.
- c. The term “net price” refers to the effective institutional price minus grant aid from the federal government, which is not specific to any college or university, in addition to institutional aid.
- d. The term “investment returns” refers to endowment-specific investment returns and does not include returns on assets held outside of endowments.
- e. The term “excess investment returns” refers to investment returns minus Defendants’ annual spending rate out of the endowment and minus inflation (a measure which is defined in more detail below).
- f. The term “relevant market” refers to the relevant market, defined in the Complaint, of elite, private, national universities that consistently rank among the

top 25 national universities for undergraduate admissions in national surveys such as *U.S. News & World Report*. Compl. ¶ 244.

8. Counsel for Plaintiffs and the proposed Class have asked me to address the following:

- a. Whether Defendants experienced substantial investment returns and endowment growth during the Class Period.
- b. Whether statistical analyses of Defendants' endowment investment returns are consistent with the Overarching Agreement, and with Defendant's participation in it, and inconsistent with competition and unilateral conduct.
- c. Whether and the extent to which, during the Class Period, each Defendant could have spent more of its endowment earnings on institutional aid than it did while still increasing its endowment in inflation-adjusted dollars.

## II. Summary of Conclusions

9. My primary findings are as follows:

- a. Defendants experienced substantial investment returns and endowment growth.** On average, Defendants' inflation-adjusted endowments more than doubled between 1991 and 2003 (122% real growth), and more than doubled again between 2003 and 2022 (144% real growth). By 2020, 14 of the 17 Defendants had endowments of more than \$1 million per undergraduate student. Defendants' endowments grew largely because of substantial average cumulative investment returns: 322% between 2003 and 2020 and 479% between 2003 and 2022. During this period of endowment growth, Defendants also realized inflation-adjusted increases in revenue collected per student.
- b. My statistical analysis shows that Defendants spent less on institutional aid out of their "excess returns" on their endowment investments after the Challenged Conduct**

**began, a result that is consistent with the Overarching Agreement and Defendants' participation in it.** My regression analysis measures whether and to what extent institutions changed their use of endowment returns to increase institutional aid and reduce net and effective institutional prices after the introduction of the Challenged Conduct. The fact that institutions reduced the allocation of endowment returns to institutional aid relative to the years before the Challenged Conduct to a statistically significant degree indicates that when Defendants were not engaging in the Challenged Conduct, and thus setting effective institutional prices unilaterally in a more competitive fashion, Defendants charged members of the Class lower effective institutional prices. The regression analysis is thus consistent with Plaintiffs' allegations that Defendants were not competing in an unfettered way for students on the basis of price or setting those prices unilaterally when they were members of the 568 Group.

- c. **All Defendants could have substantially increased their institutional aid during the Class Period while increasing the purchasing power of their endowments.** If each Defendant increased by 10-20% its annual institutional aid during the Class Period, each Defendant would still have increased its endowment's purchasing power (using either the higher-education price index or the consumer price index to measure inflation). Had Defendants not charged any tuition for each and every institutional aid recipient during the post-2003 period covering years of the Challenged Conduct, Defendants' endowments would have grown by 112%—that is, more than doubled. Defendants' endowments also would continue to grow substantially ten years into the future, through 2032, had they thus been 10-20% more generous.

10. My work relies primarily on publicly available data on institutional spending, aid, endowment levels, and investment returns. I have reviewed and incorporate multiple papers from the economics literature in my analyses. These papers are listed in Appendix A.

11. I describe my empirical methods, evidence, and analyses demonstrating each of the findings summarized above in detail below. The opinions expressed in this report are based on my assessment of the data, evidence, and other relevant materials to date.

12. I reserve the right to supplement or amend my opinions should new materials or information become available.

### **III. Qualifications**

13. I am an Associate Professor of economics at the University of California, Santa Cruz, where I teach econometrics at the bachelors and masters levels and applied microeconomics at the Ph.D. level. I am a Research Associate with the National Bureau of Economic Research. I received my Ph.D. in Economics from Stanford University.

14. I am an applied microeconomist with research in the economics of education, labor economics, and public economics. Much of my research has focused on access to higher education, examining factors including household financial resources, financial aid, federal tax credits, and the use of university and college endowment revenue.

15. I have published in leading general interest and field journals in economics, including the *American Economic Review*, *American Economic Journal: Applied Economics*, *Journal of Public Economics*, *Journal of Labor Economics*, the *Economics of Education Review*, and *Education Finance and Policy*. I have published chapters on higher-education topics in *The Routledge Handbook of the Economics of Education* and the *Handbook of the Economics of Education*. I have served as an associate editor of the *Public Finance Review*. My curriculum vitae is attached as Appendix C.

16. I have no financial stake in the outcome of this case. I am being compensated for my work in this matter at a rate of \$500 per hour whether Plaintiffs prevail or not.

#### **IV. Data**

17. I base my analyses in this report primarily on data from the National Center for Education Statistics Integrated Postsecondary Education Data System (NCES IPEDS), the National Association of College and University Business Officers (NACUBO), and Defendants' Form 990 tax forms.

18. I use the NCES IPEDS data to construct measures of list price, average institutional aid, and average net price for undergraduate students. Institutions report list prices for tuition and for room and board for full-time undergraduate students. Starting with the 1999-2000 academic year, IPEDS includes institutional grant aid for full-time first-year (freshmen) students. These data include the number of students receiving each kind of aid, the average amount of this aid conditional on receipt, and the size of the freshman aid cohorts. I use these variables to construct the primary measures of aid generosity and effective institutional prices that I use in my analyses.

19. The data I use for annual endowment investment returns come from Defendants' institutional annual endowment reports and NACUBO. I also use data on endowment levels from NACUBO and NCES IPEDS. NACUBO reports end-of-year endowment levels and form the primary measures of endowments used in this report.<sup>9</sup> IPEDS data include beginning- and end-of-year endowment levels for each institution. I use the IPEDS endowment data to verify the accuracy of the NACUBO data. NACUBO and IPEDS endowment data are highly correlated for the majority of the 568 Group institutions.<sup>10</sup>

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<sup>9</sup> NACUBO did not report endowment levels for the University of Chicago in 2021 or 2022. To account for endowment levels for the University of Chicago during these years, I used publicly available institutional financial reports.

<sup>10</sup> Starting in 2008, the endowments in IPEDS for a number of universities stopped including the endowments of their medical schools. Unless accounted for, this can create a lack of comparability across years. This pattern can be

20. I verified Defendants' annual investment returns with those reported by these same institutions to Senators Baucus and Grassley in 2008 and Hatch, Brady, and Roskam in 2016, produced in this litigation. The endowment investment return data I use are reported as net percent returns after investment costs for the fiscal year. I compute cumulative investment returns to capture the long-run impacts of investment returns on endowment levels, spending, and aid generosity. I also take effective spending rates out of endowments (the amounts each Defendant draws out of its endowment to fund annual operations) from data reported by NACUBO.

21. I use expenditure data for Defendants from NCES IPEDS, which reports expenditures separately for different spending categories, such as instruction, academic support, student services, auxiliary enterprises, institutional support, research, and hospitals.<sup>11</sup>

22. I use two price indices for my analyses, stating my outcome variables in real 2022 dollars: (a) the Consumer Price Index (CPI) reported by the Bureau of Labor Statistics and (b) the Higher Education Price Index (HEPI), reported by the Commonfund.<sup>12</sup> The latter index is designed to capture the costs faced by college and universities.<sup>13</sup> I use these price indices for various purposes, including examination of how real endowment levels have changed over time; how tuition revenue per student has changed over time; estimating excess investment returns above target spending rates and inflation; and aggregating investment returns over time in current dollars.

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observed for Chicago, Cornell, and Northwestern. NACUBO data for Carnegie Mellon University includes funds held by The Dietrich Foundation starting in 2013, and therefore lacks comparability over time. IPEDS data is used for this institution.

<sup>11</sup> Auxiliary enterprises include residence halls, dining, and health services, while institutional support is administration and management.

<sup>12</sup> The Commonfund data are available through this website: <https://info.commonfund.org/commonfund-higher-education-price-index>.

<sup>13</sup> I use both indices at the level of the fiscal year in order to match university financial reporting and academic year outcomes.

## V. Analysis

23. In this section, I address the issues summarized in my assignment. I begin by presenting some basic available data regarding the size and growth of Defendants' endowments, and their investment returns on these endowments over the past three decades, broken down into two broad periods: (a) 1991-2003, or the years before the Challenged Conduct, and (b) 2003-22, or years covering the Challenged Conduct. These general trends are useful as background.

### A. Key Trends

#### 1. Endowment Levels

24. Institutional endowments for the Defendants grew substantially in real terms over the past three decades. As shown in Table 1, the average endowment for all Defendants combined increased by 235% in nominal terms (before adjusting for inflation) between 1991 and 2003.<sup>14</sup> Adjusted using the HEPI, the average endowment growth among all Defendants was 122% between 1991 and 2003. Real endowments also grew at all Defendants; and for 10 of the Defendants, real endowment levels more than doubled from 1991 to 2003. Caltech's 42% growth was the smallest, Duke's 279% was the largest.

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<sup>14</sup> Note that endowments also grew in the years prior to 1991. For example, Defendants' endowments were 27% higher in 1991 than in 1988.

Table 1: Endowment Growth 1991 to 2003

Institution	Endowments (in millions)		Endowment Growth	
	1991	2003	Unadjusted	Adjusted
Brown University	431	1,461	239%	125%
California Institute of Technology	534	1,145	114%	42%
Columbia University	1,526	4,350	185%	89%
Cornell University	954	2,855	199%	99%
Dartmouth College	595	2,121	257%	137%
Duke University	528	3,017	472%	279%
Emory University	1,290	4,020	212%	107%
Georgetown University	266	591	122%	47%
Johns Hopkins University	561	1,715	205%	103%
Massachusetts Institute of Technology	1,443	5,134	256%	136%
Northwestern University	1,047	3,051	191%	93%
Rice University	1,140	2,938	158%	71%
University of Chicago	1,080	3,222	198%	98%
University of Notre Dame	637	2,573	304%	168%
University of Pennsylvania	826	3,547	330%	185%
Vanderbilt University	613	2,019	229%	118%
Yale University	2,567	11,035	330%	185%
Average Growth			235%	122%

**Notes:** This table presents end-of-fiscal-year endowment levels in 1991 and 2003 in millions of dollars. Endowment values are not adjusted for inflation. Adjusted growth in the last column is based on the Commonfund Higher Education Price Index.

25. Defendants' endowments continued to grow after 2003. Table 2 presents endowment growth between 2003 and 2020. Despite the Financial Crisis, Defendant endowment values increased, on average, by 207% in nominal terms over this period, indicating that endowments tripled in value. Adjusted for higher-education inflation, the average endowment value increased by 95%, an approximate doubling in value. Defendants experienced real endowment gains ranging from 25% to 195% between 2003 and 2020.

Table 2: Endowment Growth 2003 to 2020

Institution	Endowments (in millions)		Endowment Growth	
	2003	2020	Unadjusted	Adjusted
Brown University	1,461	4,377	200%	90%
California Institute of Technology	1,145	2,838	148%	57%
Columbia University	4,350	11,257	159%	64%
Cornell University	2,855	7,219	153%	60%
Dartmouth College	2,121	5,975	182%	79%
Duke University	3,017	8,474	181%	78%
Emory University	4,020	7,937	97%	25%
Georgetown University	591	1,864	215%	100%
Johns Hopkins University	1,715	6,750	294%	149%
Massachusetts Institute of Technology	5,134	18,496	260%	128%
Northwestern University	3,051	10,927	258%	127%
Rice University	2,938	6,164	110%	33%
University of Chicago	3,222	8,204	155%	61%
University of Notre Dame	2,573	11,963	365%	195%
University of Pennsylvania	3,547	14,877	319%	166%
Vanderbilt University	2,019	6,917	243%	117%
Yale University	11,035	31,202	183%	79%
Average Growth			207%	95%

**Notes:** This table presents end-of-fiscal-year endowment levels in 2003 and 2020 in millions of dollars. Endowment values are not adjusted for inflation. Adjusted growth in the last column is based on the Commonfund Higher Education Price Index.

26. Defendants' endowments grew substantially after 2020, resulting in even greater gains when measuring changes between 2003 and 2022. As shown in Table 3, between 2003 and 2022, the average endowment of Defendants grew by 316% in nominal terms. After adjusting for higher-education inflation, the growth was 144% over this period. Of the 17 Defendants institutions in the 568 Group, 12 had real endowment growth of more than 100% between 2003 and 2022. The institutions with the least endowment growth nonetheless experienced real gains of approximately 50%.

Table 3: Endowment Growth 2003 to 2022

Institution	Endowments (in millions)		Endowment Growth	
	2003	2022	Unadjusted	Adjusted
Brown University	1,461	6,141	320%	147%
California Institute of Technology	1,145	3,635	217%	86%
Columbia University	4,350	13,280	205%	79%
Cornell University	2,855	9,838	245%	102%
Dartmouth College	2,121	8,066	280%	123%
Duke University	3,017	12,116	302%	136%
Emory University	4,020	9,998	149%	46%
Georgetown University	591	3,210	443%	219%
Johns Hopkins University	1,715	8,244	381%	182%
Massachusetts Institute of Technology	5,134	24,740	382%	183%
Northwestern University	3,051	14,121	363%	171%
Rice University	2,938	7,814	166%	56%
University of Chicago	3,222	9,915	208%	80%
University of Notre Dame	2,573	16,729	550%	281%
University of Pennsylvania	3,547	20,724	484%	243%
Vanderbilt University	2,019	10,206	405%	196%
Yale University	11,035	41,383	275%	120%
Average Growth			316%	144%

**Notes:** This table presents end-of-fiscal-year endowment levels in 2003 and 2022 in millions of dollars. Endowment values are not adjusted for inflation. Adjusted growth in the last column is based on the Commonfund Higher Education Price Index.

27. As a result of robust endowment growth between 1991 and 2022, the average endowment of Defendants was 14.4 times larger in 2022 than in 1991, and 5.5 times larger after adjusting for higher-education inflation. Relative to 1991, real growth in Defendants' endowments ranged from 165% to over 900%. Overall, endowments have grown substantially in real terms, driven by extended periods of sustained growth during the 1990s, 2000s, and 2010s.

28. Defendants' endowment dollars per-student also have grown over time. Table 4 presents endowment per undergraduate student (FTE) in 1991, 2003, 2020, and 2022, all adjusted to 2022 dollars using the HEPI. Average real endowment per undergraduate grew from less than

\$600,000 in 1991 to nearly \$1.1 million in 2003 and \$2.1 million in 2022. As of 2022, 14 of 17 Defendants had endowments of more than \$1 million per undergraduate student. Across institutions this represents real growth of 111% between 2003 and 2022 and growth of 352% since 1991. In other words, accounting for inflation, as of 2022, each Defendant on average had more than four times more endowment wealth per undergraduate than it did in 1991, and more than twice as much as in 2003. The combination of high endowment growth and modest enrollment growth drove the increase in endowment per student.<sup>15</sup>

Table 4: Real Endowment Per Undergraduate Student

Institution	Endowment Per Undergraduate (2022 Dollars)			
	1991	2003	2020	2022
Brown University	193,929	426,776	679,629	854,279
California Institute of Technology	1,695,572	2,079,617	3,268,751	3,682,878
Columbia University in the City of New York	757,276	1,151,303	1,537,926	1,573,889
Cornell University	178,275	355,164	518,614	635,904
Dartmouth College	408,033	893,421	1,459,317	1,770,590
Duke University	216,083	833,771	1,383,605	1,767,249
Emory University	639,425	1,101,621	1,215,708	1,414,348
Georgetown University	119,692	162,472	278,817	435,731
Johns Hopkins University	376,916	585,153	1,223,844	1,399,978
Massachusetts Institute of Technology	852,521	2,116,124	4,428,761	5,368,894
Northwestern University	323,404	615,033	1,398,324	1,641,728
Rice University	1,050,319	1,816,741	1,681,543	1,863,913
University of Chicago	814,361	1,305,225	1,291,611	1,302,002
University of Notre Dame	218,448	532,632	1,482,758	1,866,526
University of Pennsylvania	206,182	562,338	1,459,058	1,958,749
Vanderbilt University	304,923	563,601	1,090,480	1,443,656
Yale University	1,263,647	3,550,113	5,536,343	6,333,920
Average	565,824	1,097,124	1,760,888	2,077,308

**Notes:** This table presents endowment per undergraduate FTE in 1991, 2003, 2020, and 2023. The values are adjusted to 2022 dollars using the Commonfund Higher Education Price Index.

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<sup>15</sup> Undergraduate enrollment grew by an average of 9.4% between 1991 and 2003 and by 19.9% between 2003 and 2022. Graduate student growth was somewhat higher between 2003 and 2022, leading to overall enrollment change of 37% between 2003 and 2022, due in large part to the expansion of master's programs, including online and hybrid programs. Real endowment growth per student, including graduate enrollment, averaged 83% between 2003 and 2022.

## 2. **Investment Returns**

29. Table 5 displays data on Defendants' endowment investment returns. The table shows that returns averaged 9.2% between 2003 and 2020 and 10.3% between 2003 and 2022. The Financial Crisis resulted in average losses of 19% in the 2009 fiscal year; gains exceed 15% in 2004, 2006, 2007, 2011, 2014, and 2021. As a result, cumulative returns averaged 322% across Defendants between 2003 and 2020 relative to a 58% change in higher-education costs. Likewise, cumulative returns averaged 479% between 2003 and 2022 relative to a 71% change in costs. This report considers these differences in returns across institutions and over time to examine the impact of greater financial resources on institutional aid generosity.

30. Table 5 compares Defendants in annual and cumulative endowment returns, from 2000 to 2022, to provide context for my analysis later in this report. Between 2003 and 2020, average returns ranged from 7.2% to 11.3%, and between 2003 and 2022 they ranged from 8.2% to 12.8%. Between 2003 and 2020, cumulative returns ranged from 198% to 479%; including 2021 and 2022 expands the range from 293% to 753%. That is, while each Defendant had positive investment returns, some experienced substantially larger returns than others.

Table 5: Annual and Cumulative Endowment Investment Returns

Institution	FY 2003 to 2020		FY 2003 to 2022	
	Annual	Cumulative	Annual	Cumulative
Brown University	9.6%	336%	11.0%	530%
California Institute of Technology	8.4%	278%	8.6%	338%
Columbia University in the City of New York	10.2%	383%	10.4%	490%
Cornell University	8.2%	241%	9.4%	378%
Dartmouth College	9.8%	353%	11.0%	544%
Duke University	10.1%	357%	11.9%	602%
Emory University	8.0%	250%	8.8%	351%
Georgetown University	7.2%	198%	8.2%	293%
Johns Hopkins University	7.9%	243%	8.7%	330%
Massachusetts Institute of Technology	11.3%	479%	12.8%	753%
Northwestern University	9.5%	336%	10.3%	482%
Rice University	9.2%	316%	10.1%	466%
University of Chicago	9.0%	300%	9.6%	401%
University of Notre Dame	10.8%	429%	12.1%	654%
University of Pennsylvania	8.6%	281%	9.9%	438%
Vanderbilt University	7.8%	237%	9.8%	407%
Yale University	11.3%	453%	12.2%	682%
Average	9.2%	322%	10.3%	479%

**Notes:** This table presents average annual endowment investment returns and cumulative returns for 2003 to 2020 and 2003 to 2022.

### 3. Student Revenue

31. Defendants realize revenue from students by charging for tuition, room, and board.

While realizing high investment returns and endowment growth, Defendants did not reduce the amount of tuition and other revenue they collected per undergraduate student. Specifically, list prices increased such that, as shown in table 6, Defendants' net revenue in real terms modestly increased between 2003 and 2022. Increasing revenue from students reduced Defendants' need to tap their endowments and the investment returns on their endowments to support annual operations.

Table 6: Revenue Per Undergraduate Student

Academic Year	Tuition and Room and Board		Tuition Only	
	CPI	HEPI	CPI	HEPI
2003	26,573	42,265	45,312	18,268
2004	27,464	42,549	45,173	18,798
2005	29,084	43,582	46,030	20,033
2006	30,452	44,206	45,853	20,923
2007	32,223	45,491	47,177	22,245
2008	33,189	45,113	46,297	22,725
2009	33,844	46,167	46,179	22,906
2010	33,721	45,257	45,603	22,400
2011	35,319	45,952	46,672	23,595
2012	36,726	46,813	47,736	24,536
2013	38,119	47,887	48,782	25,479
2014	39,950	49,386	49,641	26,877
2015	41,304	51,000	50,307	27,805
2016	42,075	51,305	50,472	28,115
2017	43,503	51,939	50,638	29,114
2018	44,203	51,517	50,121	29,329
2019	45,444	52,021	50,054	30,041
2020	47,070	53,226	50,861	31,111
2021	47,677	51,492	50,151	31,761
2022	49,488	49,488	49,488	32,475
				32,475

**Notes:** Tuition, room, and board revenue per undergraduate student is list price tuition, room, and board less average institutional aid per undergraduate. Tuition revenue per undergraduate student is list price tuition and fees less average institutional aid per undergraduate. The values are adjusted by fiscal year CPI and the Commonfund Higher Education Price Index.

**B. The Effects of Endowment Returns on Institutional Aid, Net Prices, and Effective Net Prices Before and After the Introduction of the Challenged Conduct**

32. This section examines the extent to which the Defendants used endowment investment returns to increase institutional aid and reduce prices before and after the beginning of the Challenged Conduct. In a competitive environment, institutions with high investment returns could use their enhanced wealth to reduce their list price or offer more generous institutional aid to attract students. My analysis compares the responsiveness of institutional aid, net prices, and effective institutional prices charged to members of the Class at Defendants during the years they were

engaging in the Challenged Conduct and the years prior in which they agree they were not. The results reveal clear evidence that prior to the introduction of the Challenged Conduct, higher endowment returns resulted in greater financial aid and reduced net prices and effective institutional prices. In contrast, during Defendants' years of the Challenged Conduct, higher endowment returns were not allocated to increasing aid or reducing prices. The differences in the allocation of endowment returns before and after the presence of the Challenged Conduct are large in magnitude and highly statistically significant. These differences are also consistent with Defendants' participating in the Challenged Conduct.

33. The underlying hypothesis tested in the analysis in this section is that the higher the investment returns on the endowment, the more an institution devotes to institutional aid. I focus here on the effect of what I call the "excess" investment returns on institutional aid, net price, and effective institutional prices. Excess endowment investment returns are those that exceed the target spending rate from the endowment and inflation. I understand from my own research on endowments in higher education it is a common objective to have the endowment, on average, maintain its purchasing power. For example, if institutions target spending at a rate of 4.5% of start-of-year endowment and inflation is 2.5%, then an investment return of 7% would allow an endowment to grow at the rate of inflation and to maintain a constant level of real spending over time. Returns exceeding that level would represent excess returns that would cause the endowment to grow (in real terms) and enable increased spending in future years without impairing the ability of any institution's endowment, including endowment of Defendants, to maintain its purchasing power.

34. Accordingly, I examine through standard regression analysis the effect of cumulative excess returns on Defendants' effective institutional prices, spending on institutional aid, and

net prices. I first identify and calculate the excess returns for each Defendant for 2000-2022.<sup>16</sup> The calculations of excess returns, by definition, do not include increases in endowment levels due to new gifts.

35. In the baseline analysis, I use the same effective spending rate of 4.7% for all Defendants—namely, average spending rates by year reported by NACUBO for institutions with endowments of \$1 billion or more (calculated over the 2003-22 period).<sup>17</sup> The spending rates are defined as current year spending from the endowment divided by current start-of-year endowment levels.

36. Spending from endowments is determined by institutional spending “rules” or targets. The most common spending rule sets current year spending from the endowment as a percent of lagged endowment levels. For example, an institution might target spending of 4 to 6% of the average value of the endowment over the prior three years.<sup>18</sup> The majority of Defendants had spending policies of this type between 2000 and 2022.<sup>19</sup> Because endowments generally grow over time, the effective spending rate from the endowment (current spending divided by current value) was typically smaller than the percentages associated with the spending rule.<sup>20</sup> Another common approach to spending from the endowment is the hybrid or Tobin rule, in which spending is

<sup>16</sup> Some Defendants report similar exercises in their financial reports. For example, Northwestern’s annual Financial Report includes a table called “Annualized Returns: Exceeding the Objective” that subtracts the inflation rate and spending rate from annual returns. Similarly, in 2018, Rice’s Fiscal Year 2018 Endowment report includes a table that subtracts CPI and their spending rate from investment returns.

<sup>17</sup> For years for which I have data on the effective spending rates from endowments for the Defendants, they closely mirror the averages for institutions with endowments of at least \$1 billion reported in NACUBO.

<sup>18</sup> Thus, spending from the endowment during 2016-2017 might be 5% of the average endowment levels at the end of the 2013-2014, 2014-2015, and 2015-2016 fiscal years.

<sup>19</sup> In 2008, 10 of the Defendants had lagged endowment rules, while 2 more had goals based on lagged endowment values but remained flexible about deviating from the rule in each year. In most cases, the targets are based on 3-year or 12-quarter lagged endowment averages.

<sup>20</sup> Endowments have increased in value over time (as documented in the prior section), so the average of the endowment over the prior three years is typically smaller than the current value. Spending 5% of the lagged endowment average will thus correspond to effective spending of less than 5% of the current endowment.

partially determined by lagged endowments and partially by prior year spending from the endowment.<sup>21</sup> Institutions often change their target percentages over time and, in some cases, switch between spending rules (e.g., moving from a lagged endowment policy to a hybrid policy). Because of these spending targets, spending from the endowment depends mechanically on prior investment returns.

37. Annual variations in excess investment returns reflect the fact that investment returns relate to deliberate decisions by endowment investment managers about how to allocate investments in the endowment, and that investment managers tend to mimic investment strategies used at other institutions.<sup>22</sup> Nonetheless, because annual investment returns of different assets classes, and individual assets that make up those classes, have a random component to them, investment returns (and thus my excess investment variable) are “largely exogenous.”<sup>23</sup> This means, as a statistical matter, I can use the randomness built into my excess investment return variable to see how it relates to the “outcome variables” of interest here: institutional aid, net prices, and effective institutional prices.

38. The regression model explains the outcome variables for Defendants by the “independent variables”: the moving three-year average of their excess investment returns, and “fixed effects,” which are widely used in regression analysis. The regression can be stated as follows:

$$\text{Outcome}_{i,y} = \alpha_i + \alpha_y + \beta_1 \text{LaggedCumulativeReturns}_{i,y} + \varepsilon_{i,y}$$

39. Fixed effects (a sub i and a sub y) capture the unique characteristics of each institution and each year that may affect the outcome variables, apart from any effect exerted by excess

<sup>21</sup> For example, spending from the endowment during 2016-2017 is 70% of 2015-2016 endowment spending plus inflation and 30% is 5% of the three-year lagged average value of the endowment.

<sup>22</sup> Goetzmann and Oster (2014).

<sup>23</sup> Brown *et al.* (2014).

investment returns. I adjust all outcome variables for inflation using the HEPI index. The regression will reveal how these outcomes changed over time with excess investment returns, taking account of years before and after the introduction of the Challenged Conduct (giving credit to each Defendant when it claims to have left the 568 Group). I use Huber-White standard errors to calculate the statistical significance of the estimated coefficients on the independent variables.<sup>24</sup>

40. I estimate the regression by using the natural logs of the inflation adjusted value of each variable of interest. This is a standard statistical practice, and one that allows the coefficient estimates to be interpreted in percentage terms. Thus, the coefficient on the investment returns variable is interpreted as the percent change in the outcome variable in response to a 1 percent increase in excess returns. For example, when examining institutional aid, a coefficient of 0.25 would indicate that a 1% increase in excess returns increases institutional aid by 0.25%, or equivalently, that a 100% increase in excess returns increases institutional aid by 25%. I estimate the regression for all Defendants in the same regression (constituting a “pooled” regression), in order to produce results that are statistically meaningful.

41. Table 7 presents regression results that illustrate the relationship between excess investment returns and institutional grant aid, net price, and effective institutional price in the period for Defendants before the Challenged Conduct began.<sup>25</sup> The estimates reveal that a 100% increase in excess returns results in a 21.5% increase in institutional aid. This result reveals that Defendants during the years prior to the introduction of the Challenged Conduct did not offset

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<sup>24</sup> I use the Huber-White, or robust, standard errors, which are widely used in the economics literature, to produce consistent estimates of the standard errors in the presence of heteroskedasticity, which occurs when errors do not have the same variance throughout the sample.

<sup>25</sup> This means that the pre period is 2000 through 2003 for 12 of the Defendants who had joined the 568 Group by then, and through 2004 for Brown, Dartmouth and Emory, who joined in 2004. The post period includes all Defendants, accounting for the claimed withdrawals by Brown, Emory, Chicago, Penn and Vanderbilt, and counting Caltech as having joined in 2019 and Johns Hopkins in 2021.

additional endowment revenue for grant aid by reducing grant funding from other revenue sources. I also find that as investment returns increase, net prices and effective institutional prices decrease. A 100% increase in excess returns reduces the net price by 26.9% and the effective institutional price by 25.4%. Each of these results is statistically significant and consistent with the Defendants using endowment investment returns to increase grant aid and reduce prices for students in the years prior to the Challenged Conduct.

Table 7: Prior to the Introduction of the Challenged Conduct

	Institutional Grant Aid	Net Price	Effective Inst. Price
Lagged Excess Returns	0.215*** (0.065)	-0.269*** (0.095)	-0.254*** (0.063)
Mean Dep Observations	10.25 72	10.22 71	10.31 72

**Notes:** This table presents the effect of cumulative excess returns on the natural log of institutional grant aid, net price, and effective institutional price. The estimates are for 568 Group Defendants prior to the 2003-2004 or 2004-2005 academic years accounting for when they first engaged in the Challenged Conduct. Estimates are based on a specification that includes institution fixed effects and year fixed effects. Standard errors are Huber-White robust. The symbols \*, \*\*, and \*\*\* represent statistical significance at 10%, 5%, and 1%, respectively.

Table 8 examines the responsiveness of institutional aid and prices to excess investment returns at 568 Group institutions during their years in which they participated in the Challenged Conduct, giving credit for Defendants for withdrawing from the Overarching Agreement in years they claim to have done so.<sup>26</sup> The regression results reveal that institutions with higher excess returns did not allocate the resulting revenue to institutional grant aid during this period. A 100% increase in excess returns (which would double the endowment after accounting for spending and

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<sup>26</sup> I offer no opinion as to whether claimed withdrawals were effective as a matter of law.

higher-education inflation) *reduces* institutional grant aid by 4.4%. That is, there is a -25.9% change (from +21.5% to -4.4%) in the extent to which institutions allocate endowment returns to aid before and after the introduction of the Challenged Conduct. This difference between the pre and post Challenged Conduct periods is highly statistically significant. The coefficient for institutions after the introduction of the Challenged Conduct is not only smaller than the years before, but it also reveals that higher investment returns had no positive impact on institutional aid during years of the Challenged Conduct.

Table 8: During Years in Which Defendants Engaged in the Challenged Conduct

	Institutional Grant Aid	Net Price	Effective Inst. Price
Lagged Excess Returns	-0.044 (0.055)	-0.010 (0.083)	-0.038 (0.066)
Mean Dep Observations	10.61 245	10.13 245	10.22 245

**Notes:** This table presents the effect of cumulative excess returns on the natural log of institutional grant aid, net price, and effective institutional price. The estimates are for 568 Group institutions during membership years. Estimates are based on a specification that includes institution fixed effects and year fixed effects. Standard errors are Huber-White robust. The symbols \*, \*\*, and \*\*\* represent statistical significance at 10%, 5%, and 1%, respectively.

42. The estimated effect of investment returns on net prices also reveals a large change in behavior before and after the introduction of the Challenged Conduct. In the “prior” years, a 100% increase in excess returns is estimated to have reduced net prices by 26.9%. In contrast, in the “post” years, a 100% increase in excess returns reduced net prices by only 1.0%. This 25.9% difference in the responsiveness of net prices to investment returns before and after the introduction of the Challenged Conduct is statistically significant.

43. The difference in the responsiveness of effective institutional prices to investment returns between the pre and post years is 21.6% (-25.4% before and -3.8% after) and is also statistically significant.

44. The foregoing results imply that higher returns during the Class Period were not used to reduce net prices or effective institutional prices, which is consistent with finding no increase in aid generosity. Overall, I find no evidence that Defendants used their excess endowment returns to increase institutional grant aid and reduce prices during their years of membership. The results are consistent with additional revenue from the endowment either not being allocated to institutional grant aid, or being offset by equal-sized reductions from other revenue sources during the Class Period.

45. The regressions show that Defendants' participation in the Challenged Conduct suppressed spending on institutional aid and artificially inflated effective institutional prices. These results are consistent with Defendants' not competing in an unfettered way, or acting in an uncoordinated way, when setting institutional aid and effective institutional prices when they were engaging in the Challenged Conduct compared to when they were not.

### **1. Restricted vs. Unrestricted Assets**

46. I now consider the possibility that the effect of investment returns on some outcomes could have been muted due to restrictions on how endowment revenue could be used. Several factors suggest that this is not likely to explain the pattern of the results documented above.

47. First, Defendants had significant fractions of their endowments that were unrestricted. Endowments are comprised of traditional endowments that must be preserved, and other assets that institutions have the freedom to spend. Several analyses indicate that, during this period,

a significant fraction of endowment wealth was unrestricted and liquid.<sup>27</sup> Based on the IPEDS data, I calculate that prior to 2009, the share of institutional assets labeled as unrestricted averaged about 60% among Defendants. After 2009, the share labeled as unrestricted dropped to 38%. This reduction was due to some combination of endowment assets becoming underwater (below principal or inflation adjusted principal) during the 2008-09 Financial Crisis and the relabeling of endowment above principal as “temporarily restricted” rather than unrestricted under the revised Uniform Prudent Management of Institutional Funds Act (UPMIFA).<sup>28</sup> The percentage of assets labeled as “unrestricted,” “temporarily restricted,” and “permanently restricted” remained quite stable as financial markets performed well after 2010, a pattern suggesting that the change in asset classification primarily stems from a change in UPMIFA policy. Regardless, most Defendants have significant unrestricted assets in addition to whatever flexibility is available for using temporarily restricted assets.

48. Second, some restricted endowment assets are dedicated to scholarships and other forms of grant aid. Returns above the level necessary to maintain the spending power of the principal for these assets could have been spent on aid in a way that is consistent with UPMIFA.

49. Third, some share of endowment revenue is likely to be fungible with other revenue sources. In such cases, spending from the endowment would free up other revenue that could be allocated to grant aid. In practice, investment returns lead to greater spending overall and across

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<sup>27</sup> Conti-Brown, 2011; Brown *et al.*, 2014.

<sup>28</sup> Prior to 2008, states generally followed the Uniform Management of Institutional Funds Act, which dictated that non-profit institutions could not spend endowment funds if they fell below the level of the initial principal. This could, in times of significant down markets, significantly restrict the ability of an institution to spend from endowment funds. By 2012, this law had been replaced in nearly every state by the Uniform Prudent Management of Institutional Funds Act, which allows for prudent spending of underwater endowments, but also dictates that the future spending power, and not the baseline principal, must be preserved. There is evidence that the new law made endowments more liquid and resulted in greater spending during the Great Recession in states where it had been adopted. Anderson, 2019.

institutional spending categories (e.g., instruction, administration), which suggests that Defendants allocated endowment revenue to a wide range of activities.

50. Fourth, my methodology examines the impact of excess investment returns. Excess returns, above principal and inflation, are components of endowments for which institutions have more spending flexibility. The methodology therefore focuses on variation in endowment revenue over which institutions have control.<sup>29</sup>

## **2. Robustness Checks**

51. I display in Tables B1 and B2 the results from several robustness tests. First, I control for the number of undergraduate students enrolled at each institution. Institutions could potentially have less financial flexibility to provide higher levels of grant aid per-recipient if they were admitting larger numbers of undergraduate students. It turns out, however, that the resulting estimates are essentially identical to those in the baseline model. Specifically, there is clear evidence that investment returns are allocated to higher institutional aid and lower prices prior to the introduction of the Challenged Conduct, but no evidence that this is the case thereafter. The differences remain statistically significant.

52. I next consider whether differences in baseline wealth across institutions is driving the pattern of results. I do this by adding the interaction of baseline endowment size (endowment per student) and year to the regression specification. This addition is designed to capture any trends in the outcome variables that are common to institutions with larger and smaller endowments. When I conduct this exercise, the resulting estimates exhibit an even larger difference than the baseline case between the pre and post allocation of investment returns to institutional aid.

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<sup>29</sup> For example, Rice's Fiscal Year 2018 Endowment report documents that investment returns have regularly exceeded spending and inflation. They note: "Rice has been able to exceed this goal over several longer-term periods, which has allowed the endowment to deliver additional dollars to the annual operating budget to enhance strategic goals, including providing a transformative undergraduate education."

53. Next, I consider the impact on my estimates of the fact that a small fraction of institutional aid at some of the Defendant institutions is merit-based rather than need-based. To test if these amounts are significant enough to alter the results of the analysis, I adjust institutional aid, net price, and effective institutional price to abstract from merit aid using the best available measures. The resulting estimates are almost identical to the base case.

### **C. Defendants' Financial Capacity to Increase Institutional Aid Spending**

54. The prior section documents that Defendants did not use investment returns to increase grant aid or lower prices during the Class Period. This section explores the magnitude of the excess returns at Defendants since 2003, and thus their capacity to have increased institutional aid while still growing their endowments. Accordingly, this section provides insight into the level of aid generosity, and thus the extent to which Defendants could have lowered prices, that could have been sustained had they competed for students using their endowments.

55. I begin by identifying the amount by which endowment investment returns, on average, exceeded institutional target spending rates from the endowment and inflation. This exercise thus ignores changes in the endowment stemming from factors such as new gifts, so that I can isolate excess growth solely due to investment returns. The resulting estimates provide an approximation of the excess financial capacity due to investment returns that Defendants had during the 2003-22 period. The analysis uses average annual effective spending rates reported by NACUBO for institutions with endowments of \$1 billion or more.

56. I next calculate the excess investment amount (positive or negative) for each Defendant in each fiscal year. The excess investment return is the investment return less the annual effective spending rate and inflation. To compute the excess amount in dollars, the excess percent return is multiplied by the start of year endowment level. Results are presented for inflation based

on both the CPI and HEPI.<sup>30</sup> For a given year, the computations described in this and the preceding paragraphs capture the amount by which endowment investment returns exceeded or fell short of the target rate of spending and inflation.

57. The analysis accounts for the cumulative effects of lost future returns if the excess is removed from the endowment. In contrast, revenue drawn from the endowment is maintained at target levels for the unadjusted endowment total. That is, the effective spending rate is applied to actual endowment levels and not the lower levels based on having excess returns removed in prior years, which makes this analysis conservative. The analysis accounts for the 1.4% endowment tax implemented as part of the Tax Cuts and Jobs Act of 2017. The tax is applied to investment gains for institutions with endowment levels exceeding \$500,000 per student.

58. The result of the exercise so far described is an investment excess (or shortfall) for each Defendant in each fiscal year. This excess is above what is need to meet endowment spending rates and to maintain spending power with inflation. I sum these totals across all years in 2022 dollars (adjusted by the CPI). I examine the sensitivity of these results by increasing the effective spending rate in each year by 0.25%, revealing the impact of assuming that each Defendant had higher effective spending rates than the annual average.

59. I also present an alternative version of the exercise that assumes each Defendant used a common lagged endowment target, whereby spending was 5% of average endowment over the prior three years. This alternative calculation reveals whether the dynamics of endowment growth over time caused some Defendants to experience significantly different spending levels (and thus excess returns) under a lagged policy than would be captured by the effective spending rates based on current-year endowments.

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<sup>30</sup> While the HEPI has been higher on average over time, the CPI exceeded the HEPI in 2021 and 2022.

Table 9: Excess Investment Returns Above Effective Spending Rates and Inflation, in Millions of Dollars: 2003 to 2022

Institution	Endowment		Excess Returns	
	2003	2022	CPI	HEPI
Brown University	1,461	6,141	1,704	1,904
California Institute of Technology	1,145	3,635	158	202
Columbia University	4,350	13,280	1,552	1,791
Cornell University	2,855	9,838	1,751	1,982
Dartmouth College	2,121	8,066	1,863	2,085
Duke University	3,017	12,116	3,010	3,370
Emory University	4,020	9,998	1,550	1,758
Georgetown University	591	3,210	148	201
Johns Hopkins University	1,715	8,244	725	1,002
Massachusetts Institute of Technology	5,134	24,740	6,025	6,757
Northwestern University	3,051	14,121	1,979	2,254
Rice University	2,938	7,814	1,441	1,597
University of Chicago	3,222	9,915	1,043	1,217
University of Notre Dame	2,573	16,729	3,537	4,021
University of Pennsylvania	3,547	20,724	4,028	4,586
Vanderbilt University	2,019	10,206	1,435	2,265
Yale University	11,035	41,383	8,272	9,244

**Notes:** Columns 1 and 2 present unadjusted end-of-fiscal-year endowment levels in 2003 and 2022. Columns 3-6 present total excess investment returns above effective spending rates and inflation between the 2003-2004 and 2021-2022 academic years. Target spending rates are the annual effective spending rates reported by NACUBO for institutions with endowments of at least \$1 billion. The calculations account for the income tax placed on institutions with endowments per-student exceeding \$500,000. Columns 3 and 4 use CPI inflation while Columns 5 and 6 use HEPI inflation. The excess in each year is adjusted to 2022 dollars using the CPI.

60. Table 9 presents estimated excess returns between 2003 and 2022. Under the assumption of CPI inflation, excess returns exceeded \$1 billion dollars for 14 Defendants by 2022. Under the assumption of HEPI inflation, 15 Defendants had excess returns of at least \$1 billion between 2003 and 2022. In 2022, excess returns since 2003 above spending, inflation, and taxes represent nearly 20% of the total endowment value. For most Defendants, excess investment returns in 2022 are sufficiently large to cover 10 years or more of total undergraduate institutional aid. Increasing the annual effective spending rates used in the exercise by 0.25% reduces the

estimated total excess return amounts by only 5.4%. These results indicate that most Defendants had the endowment wealth via investment returns to substantially increase their institutional grant aid without reducing other spending from the endowment or eroding spending power.

61. Table B3 replicates the exercise under the assumption that each Defendant had a spending rule based on the average of three prior years of endowment values. This alternative has modest impacts on the pattern of excess endowment calculations. Applying such a spending rule does not result in any Defendant having far higher or lower excess returns than those estimated using the average annual effective spending rates. As with the effective rate exercise, increasing the lagged spending rate by 0.25% reduces the estimated total excess return amounts by only 4.8%.

**D. Defendants Had Ample Endowment Resources to Have Spent More on Institutional Aid and Thus to Have Reduced Effective Institutional Prices**

62. In this section I examine whether Defendants had sufficient endowment resources to have spent more on institutional aid, and thus reduced effective institutional prices, while maintaining the purchasing power of their endowments. I carry out my analysis in this section by analyzing what would have happened to Defendants' endowment levels had they been more generous in providing institutional aid in several different ways.

63. Table 10 examines the impact on Defendants' endowments if their institutional aid had been 10% or 20% higher during each year of the Challenged Conduct, with the increase fully funded by the endowment.<sup>31</sup> The exercise accounts for the fact that increasing institutional aid reduces the endowment level in the current year as well as the opportunity to accrue investment returns on those assets in the future. The exercise is conducted assuming no reduction in spending

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<sup>31</sup> I approximate each Defendant's annual amount of institutional grant aid awarded to undergraduate students as the per-recipient average multiplied by the share of students who are recipients and the number of undergraduate full-time equivalent (FTE) students. I calculated full-time equivalent students as the number of full-time students plus 0.4 times the number of part-time students. This is consistent with the average equivalence reported by institutions.

in the endowment (i.e., the revenue drawn from the endowment each year is not reduced to account for the resulting lower endowment levels).

Table 10: Impact of More Generous Aid on Endowment Levels (in millions)

Institution	Endowments (2022 Dollars)		Hypothetical 2022 Endowments With Greater Aid				Max Increase Unrestricted 2022
	2003	2022	Plus 10%	Plus 20%	Full Tuit	Full COA	
Brown University	2,492	6,141	5,897	5,653	5,343	4,472	36%
Columbia University	7,417	13,280	12,690	12,100	12,022	10,173	73%
Cornell University	4,868	9,838	8,963	8,088	6,552	2,828	19%
Dartmouth College	3,617	8,066	7,714	7,362	7,500	6,287	52%
Duke University	5,145	12,116	11,545	10,974	11,028	9,079	62%
Emory University	6,854	9,998	9,811	9,623	9,008	8,130	118%
Georgetown University	1,008	3,210	2,859	2,508	1,863	286	38%
Massachusetts Inst of Tech	8,754	24,740	24,202	23,665	23,641	21,643	133%
Northwestern University	5,203	14,121	13,496	12,870	11,552	8,791	84%
Rice University	5,009	7,814	7,536	7,259	7,063	5,840	120%
University of Chicago	5,494	9,915	9,674	9,433	8,571	7,420	98%
University of Notre Dame	4,388	16,729	15,971	15,213	13,657	10,684	90%
University of Pennsylvania	6,049	20,724	19,968	19,212	18,548	15,717	141%
Vanderbilt University	3,443	10,206	9,610	9,014	9,255	6,942	103%
Yale University	18,816	41,383	41,137	40,891	41,001	40,125	280%

**Notes:** This table presents the hypothetical impact of more generous aid on endowment levels in millions of dollars. Endowments are presented in millions of dollars. Columns 1 and 2 present adjusted end-of-fiscal-year endowment levels in 2003 and 2022. I use the HEPI index to adjust for inflation. Columns 3-6 present the value of the endowment if undergraduate institutional aid had been increased by 10%, 20%, to cover full tuition, and to cover tuition and room and board. The last column presents the maximum percentage increase in aid that could have been realized using only unrestricted endowment funds. The late-joining institutions, California Institute of Technology and Johns Hopkins University, are not included as their endowments would not have been materially reduced.

64. Several observations from Table 10 are noteworthy. First, on average, a 10% increase in institutional aid during each year of the Challenged Conduct would have resulted in a 3.9% reduction in endowment levels by 2022 (relative to their actual values in 2022). This reduction is far below the real endowment growth that these institutions experienced since 2003. After accounting for higher-education inflation, Defendants' endowments were on average 144% higher in 2022 than in 2003. This growth would have been 134% if Defendants had provided 10% more

institutional aid during each year of the post-2003 period. That is, if Defendants had thus increased their aid generosity, their endowments would nonetheless have more than doubled in real value between 2003 and 2022.

65. Similar results hold if Defendants had increased aid generosity by 20%. Endowment levels in 2022 would have been 7.8% lower than they were and real growth in the average endowment since 2003 still would have been 124%. With a 20% increase in aid generosity, 11 Defendants still would have experienced a doubling (or more) of their endowments. In fact, had Defendants not charged any tuition for each and every institutional aid recipient during the post-2003 period, Defendants' endowments would have grown by 112% -- that is, more than doubled. If each Defendant had covered the full cost of attendance (tuition and room and board) for each aid recipient, real endowment growth would have been 72%, and 15 Defendants would have realized real endowment growth.

66. With respect to unrestricted endowments, the last column of Table 10 displays the maximum increase in institutional aid that could be achieved using only unrestricted endowment assets. The resulting percentages in 2022 indicate that the Defendants could have provided substantially more aid using only unrestricted funds. As I discussed earlier regarding the greater flexibility of restricted funds than indicated by the term "restricted," the estimates in the last two columns of Table 10 are conservative as to potential aid generosity.<sup>32</sup>

67. Higher spending from endowments could cause institutions to have become more cautious in their investment strategies.<sup>33</sup> That is, institutions with concerns that endowment funds

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<sup>32</sup> As documented above, institutions are likely to have flexibility beyond unrestricted assets. Most notably, some restricted endowment assets are dedicated to scholarships and other forms of grant aid, and some share of endowment revenue is likely to be fungible with other revenue sources.

<sup>33</sup> Lerner, Schoar, and Wang (2008), Dimmock (2012), Smith (2015), and Cejnek, Franz, and Stoughton (2017), each note that institutions with larger endowments tend to take riskier investment positions and have higher average returns.

could fall below principal may have chosen less aggressive investment portfolios. Table B4 examines the effect of increasing aid generosity by 10% and 20% under the assumption that the Defendants could have become more conservative investors as a result. The estimates assume 10% lower returns (for example, had the Defendants invested more in cash). Imposing this change in investment strategies reduces endowment growth, but each endowment nonetheless would have achieved real growth while providing increased aid to students.

68. Table B5 extends the aid generosity exercise by an additional 10 years to 2032 for all institutions that remained members until 2022. This analysis addresses whether increasing aid is sustainable in the longer-run or would undermine endowment growth. In this exercise, I assume that cohort size, list price, the share of students receiving institutional aid, average institutional aid, and average total aid all grow at the average rates they did between 2003 and 2022. Then, to assess the impact of greater aid generosity on endowment growth, I project future endowment levels under three alternative assumptions about the returns on endowment investments and endowment levels: 1) returns and growth follow each institution's average between 2003 and 2022; 2) returns and growth are 2% lower than the average for each institution; and 3) returns and growth are the same for each institution and 2% lower than the average.<sup>34</sup> I adjust all projected endowment levels in Table B5 to 2022 in real dollars using the HEPI index.

69. Under the foregoing assumptions, Defendants' endowment levels would be 6% lower in 2032 if Defendants increased their institutional aid by 10% in each membership year (assuming continued membership through 2032). Nonetheless, every Defendant would experience real endowment growth from 2022 to 2032 (above and beyond growth from 2003 to 2022). Under

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<sup>34</sup> Assuming lower returns reduces predicted endowment growth, but also reduces the cumulative cost of providing greater aid (as expended endowment assets would also have grown less).

the assumption that all Defendants have the same projected investment returns from 2022 to 2032, and that these returns are 2% lower than realized averages, Defendants' endowment levels would be 6.5% lower in 2032. Still, every Defendant is projected to experience real endowment growth relative to 2022. This exercise assumes that the Defendants do not allocate spending away from other uses and towards grant aid—namely, it assumes each Defendant makes no tradeoff to prioritize institutional aid, which in practice could attenuate reductions in endowment growth.

George Bulman, Ph.D.:

A handwritten signature in black ink, appearing to read "GB Bulman".

Executed on May 14, 2024

## APPENDIX A

### MATERIALS REVIEWED AND RELIED UPON

#### Articles and Literature

Anderson, Drew M. 2019. "What Constitutes Prudent Spending from Private College Endowments? Evidence from Underwater Funds." *Education Finance and Policy* 14(1): 88-114.

Brown, Jeffrey R., Stephen G. Dimmock, Jun-Koo Kang, and Scott J. Weisbenner. 2014. "How University Endowments Respond to Financial Market Shocks: Evidence and Implications." *American Economic Review* 104(3): 931–962.

Cejnek, Georg, Richard Franz, Neal M. Stoughton. 2017. "An Integrated Model of University Endowments." Working Paper.

Conti-Brown, Peter. 2011. "Scarcity Amidst Wealth: The Law, Finance, and Culture of Elite University Endowments in Financial Crisis." *Stanford Law Review* 63 (3): 699-749.

Dimmock, Stephen G. 2012. "Background Risk and University Endowment Funds." *The Review of Economics and Statistics* 94(3): 789–799.

Ehrenberg, Ronald G. 2009. "Demystifying Endowments." TIAA-CREF Institute Advancing Higher Education Working Paper.

Goetzmann, William N., and Sharon Oster. 2014. "Competition among University Endowments." in *How the Financial Crisis and Great Recession Affected Higher Education*, eds. Jeffrey R. Brown and Caroline M. Hoxby. University of Chicago Press.

Hansman, Henry. 1990. "Why Do Universities Have Endowments?" *The Journal of Legal Studies* 19 (1): 3-42.

Lerner, Josh, Antoinette Schoar, and Jialan Wang. 2008. "Secrets of the Academy: The Drivers of University Endowment Success." *Journal of Economic Perspectives* 22 (3): 207-222.

National Association of College and University Business Officers and Commonfund Institute. 1999-2022. *NACUBO-Commonfund Study of Endowments*.

Commonfund Institute. 2022. *Commonfund Higher Education Price Index 2022 Update*.

National Center for Education Statistics (NCES). 1991-2022. Integrated Postsecondary Education Data System, Complete Data Files. U.S. Department of Education.  
<https://nces.ed.gov/ipeds/datacenter/DataFiles.aspx>.

Sedlacek, Verne O., and William F. Jarvis. 2010. "Endowment Spending: Building a Stronger Policy Framework." *Commonfund Institute Report*.

Smith, Richard. 2015. "University Endowments: Wealth, Income, Asset Allocation, and Spending." *Journal of Applied Finance* 1: 21-30.

Tobin, James. 1974. "What Is Permanent Endowment Income?" *The American Economic Review Papers and Proceedings* 64(2): 427-432.

### **Defendants' Documents and Submissions**

#### **Defendant Universities' Submissions in Response to 2008 Inquiry by Senators Baucus and Grassley**

Brown University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. BROWN\_0000009045 and accompanying attachments.

California Institute of Technology. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. CALTECH000055927 and accompanying attachments.

University of Chicago. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. UCHICAGO\_000061644 and accompanying attachments.

Columbia University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. Columbia\_00271329 and accompanying attachments.

Cornell University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. CORNELL\_LIT0000100841 and accompanying attachments.

Dartmouth University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. DARTMOUTH\_0000143175 and accompanying attachments.

Duke University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. DUKE568\_0128016 and accompanying attachments.

Emory University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. Emory\_568Lit\_0007185 and accompanying attachments.

Georgetown University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. GTWNU\_0000327938 and accompanying attachments.

Harvard University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley.

Massachusetts Institute of Technology. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. <https://news.mit.edu/newsoffice/2008/baucus-grassley-qa.pdf>

University of Notre Dame. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. ND\_0322032 and accompanying attachments.

University of Pennsylvania. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. PENN568-LIT-00163537 and accompanying attachments.

Princeton University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. GTWNU\_0000070731 and accompanying attachments.

Rice University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. RICE\_LIT0000015534 and accompanying attachments.

Vanderbilt University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. VANDERBILT-00043428 and accompanying attachments.

Yale University. 2008. Submission in Response to Inquiry by Senators Max Baucus and Charles Grassley. YALE\_LIT\_0000158448 and accompanying attachments.

**Defendant Universities' Submissions in Response to 2016 Inquiry by Senators Hatch, Brady, and Roskam**

Brown University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam.

California Institute of Technology. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. CALTECH000057308 and accompanying attachments.

University of Chicago. 2016. Draft Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. UCHICAGO\_0000142409 and accompanying attachments.

Columbia University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. Columbia\_00113881 and accompanying attachments.

Cornell University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. CORNELL\_LIT0000396925 and accompanying attachments.

Dartmouth University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. DARTMOUTH\_0000055867 and accompanying attachments.

Duke University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. DUKE568\_0127594 and accompanying attachments.

Georgetown University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. GTWNU\_0000286045 and accompanying attachments.

Harvard University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. MITLIT-000164177 and accompanying attachments.

Massachusetts Institute of Technology. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. MITLIT-000654785 and accompanying attachments.

University of Notre Dame. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. ND\_0337024 and accompanying attachments.

University of Pennsylvania. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. PENN568-LIT-00124550 and accompanying attachments.

Princeton University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. VANDERBILT-00393768 and accompanying attachments.

Rice University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. RICE\_LIT0000174829 and accompanying attachments.

Vanderbilt University. 2016. Draft Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam. VANDERBILT-00293967 and accompanying attachments.

Yale University. 2016. Submission in Response to 2016 Inquiry by Senators Orrin Hatch, Kevin Brady, and Peter Roskam.

## **Defendant Universities' Financial Reports**

Brown University Financial Statements, Fiscal Year 2022

California Institute of Technology Financial Statements, Fiscal Year 2022

Columbia University in the City of New York Financial Statements, Fiscal Year 2022

Cornell University Financial Statements, Fiscal Year 2022

Dartmouth College Financial Statements, Fiscal Year 2022

Duke University Financial Statements, Fiscal Year 2022

Emory University Financial Statements, Fiscal Year 2022

Georgetown University Financial Statements, Fiscal Year 2022

The Johns Hopkins University Financial Statements, Fiscal Year 2022

Massachusetts Institute of Technology Financial Statements, Fiscal Year 2022

Northwestern University Financial Statements, Fiscal Year 2022

University of Notre Dame du Lac Financial Statements, Fiscal Year 2022

William Marsh Rice University Financial Statements, Fiscal Year 2022

University of Chicago Financial Statements, Fiscal Year 2022

University of Pennsylvania Financial Statements, Fiscal Year 2022

Vanderbilt University Financial Statements, Fiscal Year 2022

Yale University Financial Statements, Fiscal Year 2022

**Plaintiffs' Documents and Submissions**

Second Amended and Supplemental Class Action Complaint (“Compl.”), ECF No. 308.

## APPENDIX B

Table B1: Prior to the Introduction of the Challenged Conduct: Robustness

	Institutional Grant Aid	Net Price	Effective Inst. Price
<i>Baseline</i>			
Lagged Excess Returns	0.215*** (0.065)	-0.269*** (0.095)	-0.254*** (0.063)
<i>Controlling for Undergraduate Enrollment</i>			
Lagged Excess Returns	0.213*** (0.065)	-0.276*** (0.097)	-0.252*** (0.064)
<i>Baseline Endowment Per Student X Year</i>			
Lagged Excess Returns	0.221*** (0.068)	-0.264*** (0.089)	-0.259*** (0.062)
<i>Need-Based Aid Scaling</i>			
Lagged Excess Returns	0.215*** (0.065)	-0.269*** (0.095)	-0.254*** (0.063)

**Notes:** This table presents the effect of cumulative excess returns on the natural log of institutional grant aid, net price, and effective institutional price. The estimates are for 568 Group Defendants prior to the 2003-2004 or 2004-2005 academic years accounting for when they first engaged in the Challenged Conduct. Estimates are based on a specification that includes institution fixed effects and year fixed effects. The top panel is the baseline estimate. The second panel adds the natural log of undergraduate enrollment as an additional control. The third panel includes the interaction of baseline endowment per-FTE interacted with year as a control. The fourth panel adjust each of the outcome variables to account for the small amount merit aid awarded at some institutions. Standard errors are Huber-White robust. The symbols \*, \*\*, and \*\*\* represent statistical significance at 10%, 5%, and 1%, respectively.

Table B2: During the Challenged Conduct: Robustness

	Institutional Grant Aid	Net Price	Effective Inst. Price
<i>Baseline</i>			
Lagged Excess Returns	-0.044 (0.055)	-0.010 (0.083)	-0.038 (0.066)
<i>Controlling for Undergraduate Enrollment</i>			
Lagged Excess Returns	-0.045 (0.055)	-0.010 (0.083)	-0.038 (0.066)
<i>Baseline Endowment Per Student X Year</i>			
Lagged Excess Returns	-0.139* (0.079)	0.139 (0.096)	0.064 (0.074)
<i>Need-Based Aid Scaling</i>			
Lagged Excess Returns	-0.044 (0.055)	-0.010 (0.083)	-0.038 (0.066)

**Notes:** This table presents the effect of cumulative excess returns on the natural log of institutional grant aid, net price, and effective institutional price. The estimates are for 568 Group institutions during their years of membership. Estimates are based on a specification that includes institution fixed effects and year fixed effects. The top panel is the baseline estimate. The second panel adds the natural log of undergraduate enrollment as an additional control. The third panel includes the interaction of baseline endowment per-FTE interacted with year as a control. The fourth panel adjust each of the outcome variables to account for the small amount merit aid awarded at some institutions. Standard errors are Huber-White robust. The symbols \*, \*\*, and \*\*\* represent statistical significance at 10%, 5%, and 1%, respectively.

Table B3: Excess Investment Returns Above Lagged Endowment Spending and Inflation

Institution	Endowment		Excess Returns	
	2003	2022	CPI	HEPI
Brown University	1,461	6,141	1,703	1,904
California Institute of Technology	1,145	3,635	115	161
Columbia University	4,350	13,280	1,356	1,602
Cornell University	2,855	9,838	1,644	1,881
Dartmouth College	2,121	8,066	1,827	2,053
Duke University	3,017	12,116	2,919	3,284
Emory University	4,020	9,998	1,433	1,650
Georgetown University	591	3,210	129	182
Johns Hopkins University	1,715	8,244	778	1,052
Massachusetts Institute of Technology	5,134	24,740	5,995	6,730
Northwestern University	3,051	14,121	1,810	2,090
Rice University	2,938	7,814	1,317	1,479
University of Chicago	3,222	9,915	870	1,051
University of Notre Dame	2,573	16,729	3,511	3,994
University of Pennsylvania	3,547	20,724	3,991	4,548
Vanderbilt University	2,019	10,206	1,959	2,312
Yale University	11,035	41,383	7,893	8,878

**Notes:** Columns 1 and 2 present unadjusted end-of-fiscal-year endowment levels in 2003 and 2020. Columns 3-6 present total excess investment returns above spending and inflation. Spending is based on 5% of the prior three years' endowment levels. The calculations account for the income tax assessed to institutions with endowments per-student exceeding \$500,000. Columns 3 and 4 use CPI inflation while Columns 5 and 6 use HEPI inflation. The excess in each year is adjusted to 2022 dollars using the CPI.

Table B4: More Generous Aid and Endowment Levels: Reduced Risk

Institution	Endowments (2022 Dollars)		Hypothetical 2022 Endowments With 10% Lower Returns			
	2003	2022	Plus 10%	Plus 20%	Full Tuit	Full COA
Brown University	2,492	6,141	4,864	4,647	4,374	3,602
Columbia University	7,417	13,280	10,162	9,615	9,570	7,870
Cornell University	4,868	9,838	7,585	6,771	5,381	1,937
Dartmouth College	3,617	8,066	6,239	5,918	6,052	4,948
Duke University	5,145	12,116	9,228	8,708	8,776	7,007
Emory University	6,854	9,998	8,224	8,055	7,500	6,707
Georgetown University	1,008	3,210	2,620	2,290	1,693	216
Massachusetts Inst of Tech	8,754	24,740	18,799	18,319	18,308	16,526
Northwestern University	5,203	14,121	11,205	10,628	9,453	6,921
Rice University	5,009	7,814	5,953	5,696	5,534	4,415
University of Chicago	5,494	9,915	8,013	7,793	7,008	5,958
University of Notre Dame	4,388	16,729	13,250	12,563	11,185	8,496
University of Pennsylvania	6,049	20,724	17,367	16,679	16,103	13,535
Vanderbilt University	3,443	10,206	8,486	7,935	8,168	6,033
Yale University	18,816	41,383	31,654	31,431	31,553	30,768

**Notes:** This table presents the hypothetical impact of more generous aid on endowment levels under the assumption that investment would become 10% more conservative. Endowments are presented in millions of dollars. Columns 1 and 2 present adjusted end-of-fiscal-year endowment levels in 2003 and 2022. Adjustment is based on the HEPI. Columns 3-6 present the value of the endowment if undergraduate institutional aid had been increased by 10%, 20%, to cover full tuition, and to cover tuition and room and board. The late-joining institutions, California Institute of Technology and Johns Hopkins University, are not included as their endowments would not have been materially reduced.

Table B5: Impact of More Generous Aid on Endowment Levels: 10-Year Projection

Institution	Average Returns (2022 Dollars)			Average Returns -2% (2022 Dollars)			Fixed Returns -2% (2022 Dollars)		
	2032	+10%	+20%	2032	+10%	+20%	2032	+10%	+20%
Brown University	9,823	9,312	8,801	8,147	7,720	7,294	7,807	7,412	7,016
California Inst of Tech	5,016	4,955	4,895	4,148	4,094	4,040	4,621	4,562	4,502
Columbia University	17,953	16,281	14,609	14,841	13,412	11,984	16,883	15,471	14,058
Cornell University	14,177	11,860	9,542	11,733	9,753	7,773	12,507	10,374	8,241
Dartmouth College	12,240	11,292	10,344	10,141	9,335	8,530	10,254	9,487	8,719
Duke University	18,923	17,317	15,711	15,685	14,324	12,963	15,404	14,213	13,022
Emory University	12,134	11,831	11,528	10,010	9,758	9,507	12,710	12,407	12,103
Georgetown University	5,877	5,161	4,444	4,886	4,281	3,676	4,081	3,348	2,615
Johns Hopkins University	14,157	14,157	14,157	11,756	11,756	11,756	10,481	10,481	10,481
Massachusetts Inst of Tech	42,531	40,978	39,425	35,318	34,003	32,688	31,452	30,357	29,262
Northwestern University	23,765	22,089	20,412	19,727	18,299	16,871	17,953	16,514	15,076
Rice University	9,826	9,045	8,264	8,111	7,443	6,775	9,934	9,260	8,586
University of Chicago	13,461	13,022	12,584	11,128	10,764	10,399	12,605	12,214	11,823
University of Notre Dame	33,667	31,470	29,272	28,040	26,174	24,308	21,268	19,640	18,012
University of Pennsylvania	39,426	38,005	36,585	32,802	31,620	30,438	26,347	25,121	23,894
Vanderbilt University	17,992	16,885	15,778	14,948	14,027	13,106	12,975	12,009	11,042
Yale University	62,347	61,305	60,263	51,645	50,743	49,842	52,611	51,835	51,059

**Notes:** This table presents the hypothetical impact of more generous aid on endowment levels starting in 2003 and projected to 2032. Endowments are presented in millions of dollars. Adjustment of future endowments to 2022 dollars is based on an average annual HEPI of 2.9%. Columns 1-3 assume returns and endowment growth equal to the 2003 to 2022 average for each institution, while columns 4-6 assume returns that are 2% lower for each institution. Columns 7-9 assume that each institution has the same returns and that these returns are 2% below the 2003 to 2022 average. The table presents the projected value of the endowment if undergraduate institutional aid had been increased by 10% or 20%.

**APPENDIX C**  
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University of California, Santa Cruz  
Associate Professor 2020 – current  
Assistant Professor 2013 – 2020

National Bureau of Economic Research  
Research Associate 2022 – current

**UNIVERSITY COMMITTEE MEMBERSHIP**

University of California, Santa Cruz, Committee on Admissions and Financial Aid  
Member 2021 – current

University of California Senate Committee: Board of Admissions and Relations with Schools

Member 2023 – current

**RESEARCH PAPERS AND BOOK CHAPTERS**

“The Effect of Financial Resources on Homeownership, Marriage, and Fertility: Evidence from State Lotteries.” with Sarena Goodman and Adam Isen. National Bureau of Economic Research Working Paper No. 30743.

“The Effect of College and University Endowments on Financial Aid, Admissions, and Student Composition.” National Bureau of Economic Research Working Paper No. 30404.

“The Impact of COVID-19 on Community College Enrollment and Student Success: Evidence from California Administrative Data.” with Robert Fairlie. *Education Finance and Policy* 17 (4): 745–764. 2022.

“Factors Shaping College Investment and Enrollment Gaps.” with Jesse Cunha. *The Routledge Handbook of the Economics of Education* 1: 309-342. 2022.

“Parental Resources and College Attendance: Evidence from Lottery Wins.” with Robert Fairlie, Sarena Goodman, and Adam Isen. NBER Working Paper No. 22679. *American Economic Review* 111(4): 1201-1240. 2021.

“Law Enforcement Leaders and the Racial Composition of Arrests.” *Economic Inquiry* 57(4): 1842-1858. 2019.

“Updating Human Capital Decisions: Evidence from SAT Score Shocks and College Applications.” with Timothy N. Bond, Xiaoxiao Li, and Jonathan Smith. *Journal of Labor Economics* 36 (3): 807–839. 2018.

“Weighting Recent Performance to Improve College and Labor Market Outcomes.” *Journal of Public Economics* 146: 97-108. 2017.

“Technology and Education: Computers, Software, and the Internet.” with Robert W. Fairlie. NBER Working Paper No. 22237. *Handbook of the Economics of Education* 5: 239-280. 2016.

“The Effects of the Tax Deduction for Postsecondary Tuition: Implications for Structuring Tax-Based Aid.” with Caroline M. Hoxby. NBER Working Paper No. 21554. *Economics of Education Review* 51: 23-60. 2016.

“The Effect of Access to College Assessments on Enrollment and Attainment.” *American Economic Journal: Applied Economics* 7(4): 1-36. 2015. (lead article)

“The Returns to the Federal Tax Credits for Higher Education.” with Caroline M. Hoxby. NBER Working Paper No. 20833. *Tax Policy and the Economy* 29 (1): 13-88. 2015.

#### PEER-REVIEWED JOURNAL SERVICE

2017-2022 Associate Editor - *Public Finance Review*

Apr 2024	Referee - <i>American Economic Journal: Economic Policy</i>
Apr 2024	Referee - <i>American Economic Review</i>
Mar 2024	Referee - <i>Economics of Education Review</i>
Mar 2024	Referee - <i>Journal of Human Resources</i>
Nov 2023	Referee - <i>Economics of Education Review</i>
Nov 2023	Referee - <i>Economics of Education Review</i>
Aug 2023	Referee - <i>Journal of Economic Behavior and Organization</i>
Jul 2023	Referee - <i>Quarterly Journal of Economics</i>
Jun 2023	Referee - <i>American Economic Journal: Economic Policy</i>
Jun 2023	Referee - <i>Journal of Political Economy</i>
Apr 2023	Referee - <i>Review of Economics and Statistics</i>
Jan 2023	Referee - <i>Journal of Public Economics</i>
Aug 2022	Referee - <i>Journal of Human Resources</i>
Aug 2022	Referee - <i>Journal of Applied Econometrics</i>
Jul 2022	Referee - <i>Journal of Economics, Race, and Policy</i>

Jul 2022	Referee - <i>Public Policy Institute of California</i>
Jun 2022	Referee - <i>Economics of Education Review</i>
Apr 2022	Referee - <i>Journal of Public Economics</i>
Mar 2022	Referee - <i>Economic Inquiry</i>
Mar 2022	Referee - <i>Journal of Human Resources</i>
Jan 2022	Referee - <i>Economics of Education Review</i>
Dec 2021	Referee - <i>Comparative Education</i>
Nov 2021	Referee - <i>Economic Inquiry</i>
Oct 2021	Referee - <i>Education Finance and Policy</i>
Sep 2021	Referee - <i>Quarterly Journal of Economics</i>
Aug 2021	Referee - <i>Education Economics</i>
Jun 2021	Referee - <i>Journal of Public Economics</i>
May 2021	Referee - <i>Education Finance and Policy</i>
Apr 2021	Referee - <i>Journal of Human Resources</i>
Mar 2021	Referee - <i>Education Economics</i>
Mar 2021	Referee - <i>International Tax and Public Finance</i>
Mar 2021	Referee - <i>Journal of Empirical Legal Studies</i>
Feb 2021	Referee - <i>American Economic Journal: Applied Economics</i>
Feb 2021	Referee - <i>American Economic Review</i>
Jan 2021	Referee - <i>American Economic Journal: Economic Policy</i>
Jan 2021	Referee - <i>Economics of Education Review</i>
Jan 2021	Referee - <i>Journal of Public Economics</i>
Oct 2020	Referee - <i>Journal of Policy Analysis and Management</i>
Sep 2020	Referee - <i>Economics of Education Review</i>
Mar 2020	Referee - <i>Journal of Public Economics</i>
Feb 2020	Referee - <i>Economics of Education Review</i>
Jan 2020	Referee - <i>American Economic Journal: Economic Policy</i>
Jan 2020	Referee - <i>Demography</i>

Jan 2020	Referee - <i>Journal of Human Resources</i>
Oct 2019	Referee - <i>Education Finance and Policy</i>
Aug 2019	Referee - <i>Review of Economics and Statistics</i>
Apr 2019	Referee - <i>Bulletin of Economic Research</i>
Mar 2019	Referee - <i>American Economic Journal: Economic Policy</i>
Mar 2019	Referee - <i>Journal of Policy Analysis and Management</i>
Jan 2019	Referee - <i>Journal of Human Resources</i>
Dec 2018	Referee - <i>Journal of Labor Economics</i>
Aug 2018	Referee - <i>Journal of Public Economics</i>
Jun 2018	Referee - <i>Public Finance and Management</i>
May 2018	Referee - <i>Quarterly Journal of Economics</i>
Feb 2018	Referee - <i>Public Finance and Management</i>
Oct 2017	Referee - <i>Journal of Human Resources</i>
Sep 2017	Referee - <i>American Economic Journal: Economic Policy</i>
Sep 2017	Referee - <i>Journal of Policy Analysis and Management</i>
Apr 2017	Referee - <i>American Economic Journal: Economic Policy</i>
Mar 2017	Referee - <i>Journal of Labor Economics</i>
Feb 2017	Referee - <i>Journal of Policy Analysis and Management</i>
Feb 2017	Referee - <i>Public Finance Review</i>
Feb 2017	Referee - <i>Econometrica</i>
Jan 2017	Referee - <i>American Economic Review</i>
Dec 2016	Referee - <i>Economics of Education Review</i>
Dec 2016	Referee - <i>Journal of Policy Analysis and Management</i>
Oct 2016	Referee - <i>Journal of the European Economic Association</i>
Sep 2016	Referee - <i>Journal of Human Resources</i>
Sep 2016	Referee - <i>American Economic Review</i>
Aug 2016	Referee - <i>American Economic Journal: Applied Economics</i>
Jul 2016	Referee - <i>Economics of Education Review</i>

Jun 2016	Referee - <i>Journal of Public Economics</i>
Mar 2016	Referee - <i>Review of Economics and Statistics</i>
Dec 2015	Referee - <i>American Economic Review</i>
Nov 2015	Referee - <i>American Economic Journal: Applied Economics</i>
Jul 2015	Referee - <i>Journal of the European Economic Association</i>
Mar 2015	Referee - <i>Economics of Education Review</i>
Jan 2015	Referee - <i>Econometrica</i>
Jan 2015	Referee - <i>American Economic Journal: Economic Policy</i>
Aug 2014	Referee - <i>American Economic Journal: Economic Policy</i>
Jun 2014	Referee - <i>American Economic Review</i>
Feb 2014	Referee - <i>Education Finance and Policy</i>
Nov 2013	Referee - <i>Economic Journal</i>
Jun 2013	Referee - <i>American Economic Journal: Economic Policy</i>
Apr 2013	Referee - <i>American Economic Journal: Applied Economics</i>

#### CONFERENCE AND SEMINAR PRESENTATIONS

- University of California Merced (2022): "The Effect of Financial Resources on Homeownership, Marriage, and Fertility: Evidence from State Lotteries"
- Stanford University (2022): "The Effect of Endowment Returns on Financial Aid, Admissions, and Student Composition"
- University of California Berkeley (2022): "The Effect of Endowment Returns on Financial Aid, Admissions, and Student Composition"
- University of Colorado Boulder (2022): "The Effect of Financial Resources on Homeownership, Marriage, and Fertility: Evidence from State Lotteries"
- Federal Reserve Board of Governors (2022): "The Effect of Financial Resources on Homeownership, Marriage, and Fertility: Evidence from State Lotteries"
- Purdue University (2021): "The Effect of Financial Resources on Homeownership, Marriage, and Fertility: Evidence from State Lotteries"
- Allegheny College (2020): "Law Enforcement Leaders and the Racial Composition of Arrests"
- University of California at Santa Barbara (2018): "Law Enforcement Leaders and the Racial Composition of Arrests: Evidence from Overlapping Jurisdictions"
- Hawaii Applied Micro Conference (2018): "The Effect of Federal Policy on For-Profit Higher Education"

- American Economic Association Annual Meetings: "Parental Resources and College Attendance (2018): Evidence from Lottery Wins"
- Columbia University (2017): "Parental Resources and College Attendance: Evidence from Lottery Wins"
- University of Hawaii (2017): "Law Enforcement Leaders and the Racial Composition of Arrests: Evidence from Overlapping Jurisdictions"
- Association for Public Policy Analysis and Management, 39th Annual Fall Research Conference (2017): "Parental Resources and College Attendance: Evidence from Lottery Wins"
- University of Illinois Urbana – Champaign (2016): "Parental Resources and College Attendance: Evidence from Lottery Wins"
- Haverford College (2016): "Parental Resources and College Attendance: Evidence from Lottery Wins"
- Graduate School of Business and Public Policy at the Naval Postgraduate School (2016): "Updating Human Capital Decisions: Evidence From SAT Score Shocks and College Applications"
- National Tax Association-109th Annual Conference on Taxation (2016): "Parental Resources and College Attendance: Evidence from Lottery Wins"
- All California Labor Conference (2016): "Parental Resources and College Attendance: Evidence from Lottery Wins"
- Haverford Public Policy Forum - Education Policy (2016): "Financial Policies and College Access"
- California Polytechnic State University (2014): "College in High School: The Long-Run Effects of Advanced Placement"
- California State University, East Bay (2014): "The Effect of Career Advancement on Productivity and Earnings"
- National Tax Association-107th Annual Conference on Taxation (2014): "The Returns to the Federal Tax Credits for Higher Education"
- Haverford College Alumni Economics Forum on Education and Social Mobility (2013): "Education and Social Mobility: The State of Economic Research"
- Stanford University (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"
- Oregon State University (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"
- Carnegie Mellon University (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"
- Reed College (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"
- Dartmouth College (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"
- University of Pennsylvania Wharton School (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"
- Haverford College (2013): "The Effect of Access to College Assessments on Enrollment and Attainment"

**DEPARTMENT FACULTY HIRING COMMITTEES**

2014-2015      Experimental Search Committee  
2016-2017      Econometrics Search Committee  
2017-2018      Trade Search Committee  
2018-2019      Trade Search Committee  
2020-2021      Chair, Econometrics Search Committee  
2022-2023      Chair, Applied Microeconomics Search Committee  
2023-2024      Chair, Applied Microeconomics Search Committee

**TEACHING**

2020-2024      Truth in Numbers: The Role of Statistics in Economics (ECON 104)- B.A.  
2014-2023      Applied Econometrics (ECON 216) – M.A.  
2013-2024      Applied Microeconomics (ECON 250B) – Ph.D.  
2013-2020      Introduction to Econometrics (ECON 113) – B.A.  
2014-2024      Applied Microeconomics Workshop (ECON 275) – Ph.D.